

Patent Claims

1. Microwave antenna for semiconductor modules manufactured in flip-chip technology with two semiconductor substrates metallized on their surface (a, b), wherein between the semiconductor substrates (a, b), a closed set of bumps is arranged in such a way that the distance between the bumps (2) is less than half the wavelength ( $\lambda_0/2$ ) of the microwave signal to be radiated or to be received, and, in at least one pair of side walls (3, 4) of the semiconductor substrates (a, b), an open radiation slot arises, and that, between the bumps (2) and the radiation slot, a bump (6) connected with the circuitry of the semiconductor module, is arranged, by means of which the excitation of the microwave antenna takes place.
2. Microwave antenna according to Claim 1, wherein the arrangement of the bumps (2) together with the radiation slot basically produces a triangular shape.
3. Microwave antenna according to Claim 1 or 2, wherein the slot length (d) of the radiation slot amounts to approximately half the free space wavelength  $\lambda_0/2$  of the microwave signal to be radiated or to be received.
4. Microwave antenna according to any of the previous claims, wherein the height (h) of the bumps (2) is significantly smaller than the wavelength  $\lambda_0$  of the microwave signal to be radiated or to be received.
5. Microwave antenna according to any of the previous claims, wherein the construction height of the semiconductor module is more than one-tenth of the wavelength  $\lambda_0$  of the microwave signal to be radiated or to be received.
6. Microwave antenna according to any of the previous claims, wherein the side walls (3, 4) of the semiconductor module, in the area of the radiation slot, are at least partially provided with metallization (5).
7. Microwave antenna according to any of the previous claims, wherein the bump (6) by means of which the excitation of the microwave antenna takes place is positioned in such a way that the microwave antenna exhibits an impedance adjustment for the resonance frequency.

8. Microwave antenna according to any of the previous claims, wherein, on at least one of the semiconductor substrates (a, b), in the vicinity of the antenna area composed by the bumps (2) and the radiation slot, a monolithically integrated circuit is constructed. 5
9. Microwave antenna according to any of the previous claims, wherein, between the semiconductor substrates (a, b), bumps (2) are arranged in the shape of a cross, so that a four-sector antenna is created.
10. Microwave antenna according to any of the previous claims, wherein the metallization 10 (5) of the side walls of the semiconductor substrates is implemented by means of via chains.